

PART IV

**ARIZONA WILLOW
CONSERVATION STRATEGIES BY
MANAGEMENT AGENCY**

B. Apache-Sitgreaves National Forests

ARIZONA WILLOW CONSERVATION STRATEGY

Apache-Sitgreaves National Forests Strategy by Population

Removal of the threats to the Arizona willow over the long term hinges on completion of analysis and plans for the Little Colorado Ecosystem Planning Unit. All but fifteen of the known Arizona willow plants on the Forests occur within this planning unit. Definition of the "desired future condition" for this planning unit will include conditions necessary for a sustainable population of Arizona willow. Products of this planning effort will include new Allotment Management Plans for the Greer and Voigt Allotments as well as other resource management plans (various timber sales, urban interface fuel reduction projects by Greer, Lee Valley Creek trout habitat restoration, recreation improvements, management plans for the Baldy Wilderness, Phelps RNA improvements, State Road 273 relocation/surfacing, etc) to address issues and assist in achieving desired future conditions. Development of management plans and project proposals will meet the requirements of the National Environmental Policy Act and the Endangered Species Act as well as other applicable laws and regulations. Planning will be conducted with full public involvement.

This Conservation Strategy identifies interim actions to remove threats to the species of which we have some degree of control, while long term plans are being developed.

The strategy is presented for each of the 15 populations that were identified on the Forests by Renee Galeano-Popp in her 1988 survey.

Threats - The following are believed be threats to the survival of the Arizona willow on the Apache-Sitgreaves National Forests.

- 1) Browsing by cattle and/or elk
- 2) Defoliation by rodents and insects
- 3) Beavers cutting plants and flooding habitat through dam construction
- 4) Lack of seedling establishment and survival, which may be due to, in part, competition from dense herbaceous vegetation
- 5) Reduced regeneration, which may be due to, in part, an accumulation of fine sediments high in organic content
- 6) Reduced regeneration, which may be due to, in part, soils saturated with water for long time periods, causing anaerobic conditions
- 7) Unstable stream banks
- 8) Rust infection

Definitions

Plant unit - May include many individuals of different sex or may be a single plant. A separation greater than one meter between the closest foliage of two "clumps" must exist in order to be considered separate plant units. The fact that this definition is different than what was used by Galeano-Popp for her survey at least partially explains why plant unit numbers for each population may differ between this document and her initial survey.

Plant units mapped - Those plant units that have been mapped and described in sufficient detail so that a qualified individual who has not previously visited the site would be able to relocate them.

Cage - Structure used to enclose individual plant units or groups of plant units to protect them from ungulate browsing. Cages would be constructed five feet tall with field fence or "hog wire" supported by metal T posts. The tops would also be reinforced with rebar. They would vary in size but would generally be approximately 8 feet square. They are intended to protect plants from cattle and elk.

Protection Fencing - A more permanent structure to enclose individual plant units or groups of plant units to protect them from ungulate browsing. These structures would also vary in size depending on the site, with an anticipated range of sizes from 12 to 50 feet on a side. The intent is to completely enclose plant units and to allow the opportunity for expansion. These structures would be five feet tall constructed with five strands of barbed wire. Eight foot wooden posts would be used for corners. Support would be provided by metal T posts spaced at 12 to 16 foot intervals with two wooden stays between posts. These structures are also intended to protect plants from both cattle and elk. Even though an elk can jump a five foot fence, it is assumed they will be reluctant to do so considering the size of the proposed structures.

Livestock Management Fences - Four wire fences, 46" in height used to control the location of livestock. Allow for managing the timing, duration and intensity of livestock use.

Elk/Livestock Study Fences - Nine foot high constructed with field fence for complete exclusion of cattle and elk. Used to compare the effects of complete exclusion, to exclusion of just cattle to areas that are grazed by both animals.

Site: Population No. 1, Reservation Boundary.

Location: A small un-named tributary running north east into White Mountain Reservoir, west of Reservoir adjacent to fence at the White Mountain Apache Reservation boundary, upstream of State Route 273. A small stringer of trees follows the drainage into a large meadow, the two plants are located at the base of the trees furthest downstream and on the left bank, and approximately 315 feet from the Reservation fence. Bebb's willow carcasses are found in this location, with some presently alive.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units: 2 (Popp"88) **Number of plant units mapped:** 2 (1994)

Last visited: throughout the summer and fall of 1994.

Habitat Acres: Occupied: 8.3 sq ft all one location

Potential: 10 ft wide X 1000 ft length = 0.23 acres

Riparian: 30 ft X 3800 ft = 2.62 acres

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: As of late summer 1994, these two plants seem to be in a static to slight downward trending condition. Signs of grazing have been noted in the past but this has not been extreme, and usually has not been the result of large ungulates but rather is assumed to be the result of rodent activities. In the past years one of these plants has been defoliated by insects (mourning cloak caterpillars). Leader growth has always been very short, not exceeding 6 mm per year.

Grazing Allotment Greer **Elk Herd Unit** Greer
Livestock Management Unit Baldy Pasture outside Wilderness

Site specific concerns: In the past, these plants have withstood relatively light grazing by livestock and/or elk, 20-30% defoliation by insects, and some tip die-back perhaps related to frost or fungal pathogens. These effects do not help the plant but have not been fatal. The greatest threat seems to be the small population size, and ecological conditions that result in extremely wet soil conditions, which combined with highly organic soils cause aeration to become limiting in the root zone. It is suspected that root growth is quite restricted by anaerobic conditions, which could result in limited twig elongation and small leaf sizes. Ground cover from other plants (mosses, sedges, and grasses) is high, which may limit the possibility of Arizona willow seedling establishment.

Recent past conservation actions: Stocking rates and duration have been reduced for this pasture in recent years. This allotment is permitted for 503 head of cattle 5/16-10/31. In 1993 this pasture was used for 18 days by 202 cows and calves, 6/16-7/03 (18 days, 160 AUMS). In 1994 this pasture was used for 22 days by 430 cows and yearlings and 29 bulls from 8/6-8/28 (22 days, 347 AUMS). A portion of the Slade Ranch, approximately 80 acres on the east side of Hall Creek has been acquired through a land exchange. When the legal boundaries are posted and exchange finalized, additional Arizona willow surveys will be conducted.

Proposed conservation actions

Short term: Rest the Baldy Pasture from livestock use while the new AMP is being developed. Enclose the two known plant units with a fence to protect them from elk and any unplanned livestock use. Complete this fence by June 1995.

Estimated Cost: \$350 FY95 Cage installation

Long term: Complete a new AMP for the Greer Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years. Retain the status of private lands near White Mountain Reservoir as property desirable for acquisition into the National Forest system.

Estimated Cost: \$500 FY95 and 96 LCEU planning effort
\$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. First monitoring information of this population is from Galeano-Popp's survey which was completed in 1988.

Site: Population No. 2, Hall Creek.

Location: Upper Hall Creek; 1.7 miles upstream from Highway 273, and 660 yards upstream of the Wilderness boundary (wooden decaying fence).

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 11 (Popp"88) **Number of plants units mapped** 10 (1994)

Last visited: summer and fall of 1994.

Habitat Acres: **Occupied:** 3 sites in upper totaling 58.7 sq ft 1994

Potential: discontinuous 30 ft wide X 2.3 miles = 8.3 acres from upper reaches to road SR 273

Riparian: 200 ft wide X 1.48 mi center 35.89 ac
60 ft X 1.05 mi upper 7.64 ac = 44 ac
10 ft X 0.38 mi below Slade 0.46 ac Total

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: As of late summer 1994, these plants seem to generally be in static condition, showing some small changes in size since Galeano-Popp's inventory in 1988. During most of the summer, grazing is overall very light to none, while by mid October grazing on some individuals was estimated from 50-95% of leaders, while other plants showed no use at all. During the last 7 years there has not been any change in the numbers of plants (one less was counted during 1994 likely due to inventory techniques and defining minimum spacing between plant units).

Grazing Allotment Greer **Elk Herd Unit** Greer
Livestock Management Unit Baldy Pasture within Wilderness

Site specific concerns: Grazing by livestock has been quite light and of short duration in the past few years, and browsing from elk seem to have been concentrated in the upper reaches of Hall Creek. Competition from other vegetation is severe and includes dense mosses, grasses and sedges. The surrounding meadows are in a late seral stage of succession, and disturbance from annual overbank flooding and resulting deposition of fresh sediment is extremely rare or non-existent. This portion of Arizona willow habitat is located relatively near the top of the watershed which is entirely within Wilderness. No management impacts have affected the vast majority of this watershed, and flow regimes are natural and un-regulated. However, any changes in flow regime since establishment of this willow population can be regarded as threatening. This can be the result of increasing crown cover in the forested part of the watershed, as well as type changes from a dominantly aspen composition to conifers. Evidence

of decreasing flows are visible in the form of stream channels becoming choked with vegetation and filling in to the point of near disappearance, as can be seen between the Wilderness and SR 273. The most promising section of habitat along Hall Creek is all upstream of the Wilderness boundary. Small population size may also be viewed as a concern.

Recent past conservation actions: Stocking rates and duration have been reduced for this pasture in recent years. This allotment is permitted for 503 head of cattle 5/16-10/31. In 1993 this pasture was used for 18 days by 202 cows and calves, 6/16-7/03 (18 days, 160 AUMS). In 1994 this pasture was used for 22 days by 430 cows and yearlings and 29 bulls from 8/6-8/28 (22 days, 347 AUMS). A portion of the Slade Ranch, approximately 80 acres on the east side of Hall Creek has been acquired through a land exchange. When the legal boundaries are posted and exchange finalized, surveys will be conducted.

Proposed conservation Actions

Short term: Rest the Baldy Unit from livestock use while the new AMP is being developed.

Estimated Cost: -0-

Long term: Complete a new AMP for the Greer Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years. Retain the status of private lands near White Mountain Reservoir as property desirable for acquisition into the National Forest system.

Estimated Cost: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. First monitoring information of this population is from Galeano-Popp's survey completed in 1988.

Site: Population No. 3, West Fork Little Colorado River within Wilderness.

Location: West Fork of the Little Colorado River all within the Mount Baldy Wilderness

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 363 (Popp "88) **Number plants units mapped** 258 (1994)
Difference due to 1994 inventory techniques which have been standardized and now require 1 meter between individual plant units. This required consolidation of previously separate plant units.

Last visited: summer and fall of 1994.

Habitat Acres: **Occupied:** 11,100 sq ft (Popp 1988), 34,230 sq ft 1994 census
Potential: 30 ft wide X 2.19 mi = 7.96 acres discontinuous
Riparian: Avg 100 ft max wide X 2.19 mi length = 26.55 ac
Width varies from 20 to 130 ft, 100 ft avg is generous.

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This reach of habitat contains the densest population of Arizona willow on the Forest, and the plants in the mid portion of this reach are also in the best condition. The ecological conditions in the upper reach of this population seem to be better suited to the willow than elsewhere. The lower half of this stream reach is one of the best areas to expand the population in the future. Currently, the plants in this population are in relatively good condition, although individual plants have shown substantial use late in the year. Most of this reach of stream has very little floodplain area due to the confining valley slopes. This landform keeps all high flows mostly contained in the channel, which allows finer sediments to flush through instead of accumulating into wet meadows. Channel bedload materials are 100% mobile in the silt, sand, and gravel size class, and approximately 50% mobile in the cobble size class. Bedload mobility of this magnitude is seldom encountered elsewhere, and as a result fine sediments with anaerobic conditions are less often encountered in this area.

Grazing Allotment Greer **Elk Herd Unit** Greer
Livestock Management Unit Baldy Pasture within Wilderness

Site specific concerns: This population has withstood relatively light livestock grazing pressure in recent years, while in the past it has likely been heavier. Elk use appears mostly in late fall, and browsing use on willows is primarily on those plants which are easily accessible. Plants hidden in thickets get very little grazing use. As this area has very heavy recreational use, some of the habitat is impacted from fishing and hiking along trampled paths at creek side. The long

term solution to such recreation related problems will not be easy, as any development such as hardening fishing access trails will only encourage more use. Camping does not seem to be a problem due to lack of flat ground. Recreation issues will be dealt with in the Little Colorado Ecosystem Planning Unit. Other minor threats include occasional beaver activity only near the lower end of the population, and some rust infections which are generally not severe.

Recent past conservation actions: Stocking rates and duration have been reduced for this pasture in recent years. This allotment is permitted for 503 head of cattle 5/16-10/31. In 1993 this pasture was used for 18 days by 202 cows and calves, 6/16-7/03 (18 days, 160 AUMS). In 1994 this pasture was used for 22 days by 430 cows and yearlings, and 29 bulls from 8/6-8/28 (22 days, 347 AUMS). Livestock are regularly herded from the Sheeps Crossing area.

Proposed conservation actions

Short term: Rest the Baldy Unit from livestock use while the new AMP is being developed.

Estimated Cost: -0-

Long term: Complete a new AMP for the Greer Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Cost: \$500 FY95 and 96 LCEU planning effort
\$400/yr monitoring

Monitoring: Thirty-five plants (10%) distributed throughout the population will be monitored annually according to the established protocol. First available monitoring and inventory information of this population is from Galeano-Popp's survey completed in 1988.

Site: Population No. 4, Sheeps Crossing.

Location: West Fork of the Little Colorado River downstream from Mount Baldy Wilderness boundary including Sheeps Crossing

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 4 (Popp "88) Number of plants units mapped 4 (1994)

There may be 7 plants in this population, 3 further downstream not included in Galeano-Popp's 1987 inventory.

Last visited: throughout the summer and fall of 1994.

Habitat Acres: Occupied: 33.74 sq ft (Popp "88), 75.00 sq ft 1994 census

Potential: 30 ft wide X 1.43 mi = 5.20 ac

Riparian: 100 ft max avg width X 1.43 mi = 17.33 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This area get heavy recreational use, and paths are trampled at creek side for fishing access. The plants in this stretch are in variable shape ranging from excellent to heavily grazed. The riparian vegetation in this area is generally in good shape, but shows signs of stress from soil compaction, grazing, and beaver activity. Most dams in the area get washed out due to high flows, but some persist. The area could greatly benefit from rehabilitation efforts. The best habitat for Arizona willow is that which is furthest downstream. Upstream, competition for sunlight is high due to dense riparian vegetation and spruce overstory.

Grazing Allotment Greer Elk Herd Unit Greer

Livestock Management Unit East Side Pasture

Site specific concerns: Soil compaction and the possibility of direct impacts to plants from recreationists (fishermen trailing the stream for access). Livestock grazing has been relatively heavy on these plants, especially on the plants furthest downstream, as well as on other equally palatable willow species (S. monticola). This location is fenced to connect different pastures with gates, and consequently the area gets more use. Beaver and elk also impact this area. Sedimentation from roads, parking areas, and unstable streambanks. An old railroad bed crossing the stream with one large culvert, as well as the present road (SR 273) crossing on an old narrow bridge both affect flood flows by constricting and accelerating flows, and backing water up behind the structures due to inadequate capacity. Longer periods of flooding can drown out shrubby vegetation. The small population size of this area is also a concern.

Recent past conservation actions: Stocking rates and duration have been reduced for this pasture in recent years. This allotment is permitted for 503 head of cattle 5/16-10/31. In 1993 this pasture was used for 18 days by 202 cows and calves, 6/16-7/03 (18 days, 160 AUMS). In 1994 this pasture was used for 22 days by 430 cows and yearlings, and 29 bulls from 8/6-8/28 (22 days, 347 AUMS). Livestock are regularly herded from the Sheeps Crossing area.

Proposed conservation actions

Short term: Place cages around all known plants prior to livestock use in this pasture in 1995.

Estimated Cost: \$400 FY95 Cage installation

Long term: Complete a new AMP for the Greer Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years. Through the Little Colorado Ecosystem analysis, identify measures to reduce recreational impacts. Explore options for relocating roads and parking area. Complete a plan for this area by 10/96.

Estimated Costs: \$500 FY95 and 96 LCEU planning effort
\$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. First available monitoring and inventory information of this area is from Galeano-Popp's survey completed in 1988.

Site: Population No. 5, above Lee Valley Reservoir.

Location: Lee Valley Creek; north fork upstream of reservoir.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 2 (Popp "88) **Number of plant units mapped** 1 (1994)

Last visited: summer of 1994 (July 31)

Habitat Acres: **Occupied:** 41 sq ft (Popp "88), 7.32 sq ft 1994 census.
One of the two original plants was not found in 1994.
Potential: 20 ft wide X 4020 ft (0.76 mi) = 1.85 ac
Riparian: 60 ft X 4020 ft (0.76 mi) = 5.54 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This area is in the headwaters of Lee Valley Creek, and now drains into Lee Valley Reservoir. The plant which has been caged is located near a fork in the drainage, above the reservoir. This area receives high use by elk, and in the past may have been used by beaver. Popp mentions this area as having potential for population expansion. Channel gradients are generally low, and flows are ephemeral. Surrounding vegetation is in the late seral stage of vegetative succession.

Grazing Allotment Voigt **Elk Herd Unit** Greer
Livestock Management Unit Lee Valley Pasture within Wilderness

Site specific concerns: Accumulation of sediments and type conversion from fluvially driven riparian ecosystem towards low gradient wetland types typified by anaerobic conditions. Elk have had impacts on some larger riparian shrubs through antler rubbing. Elk and livestock have had browsing impacts to this area in the past. The small population size of this site is also of concern.

Recent past conservation actions: The Lee Valley grazing management unit was rested from livestock use in 1993 and 1994. One of the two plants Popp found was caged (1986?) and remains so to date.

Proposed conservation actions

Short term: Rest the Lee Valley Pasture from livestock use while the new AMP is being developed.

Estimated Cost: -0-

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts, \$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. First available monitoring and inventory information of this area was made possible through Galeano-Popp's survey completed in 1988.

Site: Population No. 6, Lee Valley Reservoir to Colter Reservoir.

Location: Lee Valley Creek; downstream from Lee Valley dam to Colter Reservoir

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 21 (Popp "88) **Number plant units mapped** 9 (1994)

The 1994 census combined plants which were initially considered separate. Some may not have been found.

Last visited: summer of 1994 (June and July).

Habitat Acres: **Occupied:** 514 sq ft (Popp "88), 119.94 sq ft 1994 census

Potential: 30 ft wide X 0.83 mi = 3.02 ac

Riparian: 250 ft wide X 0.83 mi = 25.15 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: The plants in this population are healthy but have been severely browsed in the past. Many are in a low growth form, growing among dense sedges and bluegrass. Competition from other vegetation is severe and upper portions of this segment and may be too shaded from trees to be considered habitat. Most of the riparian shrubs of all species (especially Bebb's willows) seem stunted, not only from past grazing but likely from an extremely high water table. Twig elongation is very limited. The portion upstream of SR 273 is considered the best habitat, while downstream the gradient is too flat and boggy to be good habitat. Currently, no riparian shrubs are found downstream of SR 273 to Colter Reservoir.

Grazing Allotment Voigt **Elk Herd Unit** Greer

Livestock Management Unit Home Pasture

Site specific concerns: This segment of Lee Valley Creek has been drastically altered through dam construction and reconstruction. Initially, when Lee Valley Dam was constructed, the overflow during high flows, such as during snowmelt, was all directed down the original creek bed. Later, the dam was raised and the spillway no longer directs high flows into this creek bed, but rather has removed the flows to another drainage to the north which spills into the West Fork of the Little Colorado, instead of the East Fork. This confluence is where Colter Reservoir (not currently used) is located. As a result, the only flows which this creek bed currently receives is the leakage from the base of Lee Valley Dam; a constant but low flow. The vegetation types below the dam are slowly type converting towards a wetland, rather than a fluvially driven riparian shrub community. Soils which were originally quite open and permeable are increasing in organic and mineral fines conducive to anaerobic conditions. This

may have an impact to all riparian shrubs, including Arizona willow. The stream channel below the dam, all the way to Colter Reservoir, is currently becoming overgrown with sedges, as flows are not sufficient to maintain the channel. In order to restore this section of creek, it is highly recommended to reconstruct the current spillway of Lee Valley Dam to empty into the original channel. This will be no minor project due to elevational difference between the lake and the stream channel, making energy dissipators necessary. Other threats in this area include grazing by livestock and elk. In the past, uprooted plants have been found in this area. Caging these plants will alleviate this problem. Trespass livestock have been a problem. Small population size is also of concern.

Recent past conservation actions: The Home Unit was rested from livestock grazing in 1993. Livestock grazing was limited to 27% of the permitted numbers in 1994. This pasture was used in conjunction with the adjacent Bull pasture by 80 head of cows and yearlings; 7/21-8/9 (19 days) and 10/1-10/12 (11 days) for 51 AUMS.

Proposed conservation actions

Short term: Place cages around all known plants prior to livestock use in this unit in 1995. Preliminary fencing alternatives involve relocating the pasture division fence on the northeast side of the 273 road. The Forest recommends waiting for the completion of the AMP prior to initiating any significant fence relocation. Electric fencing of existing populations of Arizona willow along the old stream below Lee Valley reservoir will be accomplished as an interim measure. Caging the plants will provide protection for all the plants in this population from cattle and elk.

Estimated Cost: \$1300 FY95 New Fencing

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. First available monitoring and inventory information is from Galeano-Popp's survey completed in 1988.

Site: Population No. 7, Voigt Cabin.

Location: Voigt Cabin area, small spring drainage in front of cabin. Arizona willow is located downstream of the cabin.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 1 (Popp "88) **Number of plant units mapped** 2 (1994)
Another plant was recently found in this vicinity near some spruce, yet to be mapped.

Last visited: throughout the summer and fall of 1994.

Habitat Acres: **Occupied:** 1800 sq ft (Popp "88) all one area.
Potential: 50 ft wide X 1600 ft length = 1.84 ac
Riparian: 250 ft X 2500 ft = 14.35 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This cluster of plants is located on top of a spring which does not directly surface, but ground water is very near the surface making it spongy in places. In the past (1987), this site was severely affected by rust, killing much of the top growth. Since then, the plant is resprouting, but the leader lengths produced each year is quite short. Rodents also inhabit this cluster, and some leaders are nipped during winter, tunneling through the snowpack. Large ungulate grazing is not an apparent impact, although elk sign, including rubbing of large Geyers willows is evident in the area. Recent livestock use within the pasture has been limited to two horses. Upstream of the cabin the drainage seems to be spreading, saturating the ground in a wide band. The spruce in this area show substantial stress and stunting; many are drowning out. The spring area above the road was thoroughly investigated with a soil pit, and was found to be highly anaerobic.

Grazing Allotment Voigt **Elk Herd Unit** Greer
Livestock Management Unit Little Horse Pasture

Site specific concerns: Threats in this area include rust, rodent herbivory, some elk herbivory, a high water table with resulting anaerobic conditions, competition from surrounding dense grass and sedge meadow vegetation. This site may be conducive to experimentation with prescribed fire, as the willow patch itself is always wet and not in danger. The small population size is also of concern.

Recent past conservation actions: The Little Horse Pasture was to be rested from livestock use in 1993 and 1994, but received some limited trespass use.

Proposed conservation actions

Short term: Place a cage around the single small plant adjacent to Forest Road 273. Enclose the large hedge of Arizona willow with a protection fence. Complete these actions prior to livestock use in this unit in 1995.

Estimated Cost: \$450 FY95 Cage installation

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. The first inventory and monitoring information of this area is from Galeano-Popp's survey completed in 1988.

Site: Population No. 8, South Tributary to East Fork of the Little Colorado River above Phelps.

Location: East Fork of the Little Colorado River; south fork in meadow upstream from Phelps Botanical Area, and directly upstream of an old breached dam.

Land Ownership: Apache-Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 28 (Popp "88) **Number of plant units mapped** 63 (1994)

This area, especially a small trickling tributary from the east, has revealed substantially greater numbers of plants than originally found by Popp in 1987. It is not known whether these plants were simply missed, were severely suppressed by herbivory and are now resprouting, or whether some of these could perhaps be seedlings.

Last visited: throughout the summer and fall of 1994.

Habitat Acres: **Occupied:** 169.3 sq ft (Popp "88), 46.26 sq ft 1994 census
1994 data appears incomplete, results not comparable.

Potential: 30 ft wide X 3168 ft length = 2.18 ac

Riparian: 500 ft X 2000 ft = 22.96 ac approx

This approximates the entire wet meadow area.

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This population has the lowest mean plant height of all sites on the Forest, and consists mostly of plants which grow in marginal saturated conditions as well as a few in rocky soils well away from the drainage. Some plants appear stunted simply from repeated grazing which gives them a hedged growthform. These are often found underneath protective plants such as spruce or shrubby cinquefoil. This entire area is located in the very top of its watershed, and flood flows or overbank flooding does not happen. The area gets ample moisture, but hydraulic gradients in this area are conducive to forming wet meadow vegetation rather than riparian shrub communities.

Grazing Allotment Voigt **Elk Herd Unit** Greer
Livestock Management Unit Phelps Pasture all inside Wilderness

Site specific concerns: The greatest threats in this locality result from saturation and resulting anaerobic conditions conducive to wet meadow formation. Competition from surrounding vegetation is severe. Rodents have been documented in the past to have decimated several plants which were caged. In the past, grazing was relatively severe, with both livestock and elk using the area. Livestock no longer use this pasture. Elk sign is prominent in the area, and browsing

of Arizona willow occurs primarily in the fall. Frost damage has been noted in this population, as well as signs of rust or fungal infection, but these are not major impacts. Sediment is accumulated across the entire width of this meadow, and soil conditions are commonly found to be anoxic in saturated areas.

Recent past conservation actions: The Phelps Unit was rested from livestock use in 1993 and 1994. In the past (1986?) several plants were caged in this population. These were extirpated by rodents concentrating their activity inside the cage.

Proposed conservation actions

Short term: Continue to rest the Phelps Unit from livestock use while the new AMP is being developed.

Estimated Cost: -0-

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: Five plants distributed throughout the population will be monitored annually according to the established protocol. First available monitoring and inventory information is from Galeano-Popp's survey completed in 1988.

Site: Population No. 9, East Fork of the Little Colorado River above Phelps.

Location: Main stem of the East Fork of the Little Colorado River upstream from Phelps Botanical Area, all inside the Wilderness boundary.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 95 (Popp "88) Number of plant units mapped 75 (1994)
Difference due to inventory techniques and definition of "Plant Unit."

Last visited: throughout the summer and fall of 1994.

Habitat Acres: **Occupied:** 1233.3 sq ft (Popp "88)
Potential: 30 ft wide X 2.00 mi = 7.27 ac
Riparian: 245 ft X 1.61 mi = 47.81 ac approx

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: The habitat in this stream segment is highly variable; small portions are considered having high potential, while most of the area consists of a low gradient swampy wet meadow where anaerobic conditions prevail. Other willows (Bebbs and Geyers) also seem to be on the decline in this stretch. Most of the Arizona willow in this area is of a low growth form, and competition from surrounding vegetation is severe. Sedges, Kentucky bluegrass, and hairgrass form dense mats. Reduction of Kentucky bluegrass and recovery of this rather large area will be difficult as it lies entirely within Wilderness, and mechanical work is restricted. A few plants of this population inhabit rocky sections of higher gradient stream, with approximately 50% canopy cover of spruce and fir. These inhabit well drained soils.

Grazing Allotment Voigt Elk Herd Unit Greer
Livestock Management Unit Phelps Pasture all inside Wilderness

Site specific concerns: The dominant portion of this population seems to be growing in less than optimal habitat with the water table near the surface. An old breached dam is found within this population, which significantly alters the hydrology and extent of soil saturation directly upstream. Wet meadow vegetation is becoming dominant, and in places the stream channel becomes totally choked with sedges. Organic sediments and fines restrict aeration of the root zone. Grazing, in the past two years has been restricted to elk use which is in the fall. In the past, livestock grazing has also impacted some of the plants. Recreation has had some limited impact on this population in areas where the stream can be fished. Most of the area is wet meadow and not impacted by recreationists.

Recent past conservation actions: The Phelps Unit was rested from livestock use in 1993 and 1994.

Proposed conservation actions

Short term: Continue to rest the Phelps Pasture from livestock use while the new AMP is being developed.

Estimated Cost: -0-

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: Ten to twenty plants distributed throughout the population will be monitored annually according to the established protocol. First available monitoring and inventory information is available from Galeano-Popp's survey completed in 1988.

Site: Population No. 10, Phelps Botanic Area.

Location: East Fork of the Little Colorado River; all within the Phelps Botanical Area. Most of the Phelps Botanic Area is outside of Wilderness (90%).

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 74 (Popp"88) **Number of plant units mapped** 80 (1994)

Last visited: throughout the summer and fall of 1994.

Habitat Acres: **Occupied:** 4279 sq ft (Popp 1988), 7621 sq ft 1994 census.

Potential: 180 ft wide X 2135 ft length = 8.82 ac

Riparian: 375 ft X 2135 ft = 18.38 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This population is among the healthiest on the Forest. Plant density and average plant height are the highest of all populations, and general habitat conditions are near excellent. However, even with good habitat conditions, seedlings have not been found within the exclosure. This area has in the past been hit by rust quite heavily, but apparently none of the plants have succumbed. Evidence of top kill is still visible with numerous dead twigs. Plants hit the hardest seem to be those growing in swampy conditions. This population has some limited beaver activity, and pond area seems to slowly be increasing. Beaver foraging on willows is limited and not deemed excessive at this time.

Grazing Allotment Voigt **Elk Herd Unit** Greer
Livestock Management Unit Phelps Botanic Area (livestock exclosure)

Site specific concerns: Rust infection, beaver activities, trailing along streamside by fishing recreationists, elk herbivory, high water tables in portions of area, are the dominant influencing factors.

Recent past conservation actions: The fence around the botanical area has been repaired the last few years to prevent unplanned livestock use. Fence maintenance is an annual problem.

Proposed conservation actions

Short term: Continue to maintain the existing fence around the botanical area annually prior to livestock entering an adjacent unit.

Estimated Cost: \$500/yr fence maintenance

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years. As part of this planning process, evaluate the boundaries of the Research Natural Area and the need for fencing and alternative locations. This may include enlarging the fenced area to include habitat down to SR 273.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts, \$200/yr monitoring

Monitoring: Ten to twenty plants distributed throughout the population will be monitored annually according to the established protocol. First available inventory and monitoring is from Galeano-Popp's survey completed in 1988.

Site: Population No. 11, East Fork of the Little Colorado River below Phelps to Colter Reservoir.

Location: East Fork of the Little Colorado River; downstream from Phelps Botanical Area to Colter Reservoir.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 62 (Popp"88) **Number of plant units mapped** 41 (1994)

Last visited: throughout the summer and fall of 1994

Habitat Acres: **Occupied:** 1623 sq ft (Popp 1988), 2442 sq ft 1994 census.
Potential: 100 ft wide X 0.76 mi = 9.21 ac
Riparian: 150 ft X 0.76 mi = 13.82 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This stream segment supports a relatively large population with good plant height. The mean plant height decreases with the deterioration of habitat nearer Colter reservoir. Near the Phelps Botanic Area most plants are still quite healthy and form tall bushes, whereas near the reservoir plants are hedged or low and spreading among grasses and sedges. Stream gradient does not significantly change along this stretch of stream, and watertable is near the same depth throughout. Competition from surrounding vegetation (grasses and sedges) is high and may affect seedling success. The existing plants have potential for good improvement after they are fenced.

Grazing Allotment Voigt **Elk Herd Unit** Greer
Livestock Management Unit Big Horse Pasture (outside Wilderness)

Site specific concerns: Unstable stream banks, elk and livestock herbivory, and competition from surrounding vegetation are the dominant influencing factors. This area gets relatively little fishing and recreation use. A limited amount of beaver activity is found in the area, and sediment deposition may be a concern.

Recent past conservation actions: The Big Horse Unit was rested from livestock use in 1993 and 1994.

Proposed conservation actions

Short term: Place cages around all known plants prior to livestock use in this pasture in 1995, or rest the Big Horse Pasture from livestock use while the new AMP is being developed.

Estimated Cost: \$3600 FY95 Cage installation / or rest pasture

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years. As part of this planning process, evaluate the boundaries of the Research Natural Area and the need for fencing. Evaluate the option of including a portion of this population in the Phelps Botanical Area.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: Ten to twenty plants distributed throughout the population will be monitored annually according to the established protocol. The first available monitoring and inventory information is available from Galeano-Popp's survey completed in 1988.

Site: Population No. 12, East Fork of the Little Colorado River below Colter Dam.

Location: East Fork of the Little Colorado River; downstream from Colter Reservoir.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 12 (Popp "88) **Number of plant units mapped** 22 (1994)

Last visited: throughout the summer and fall of 1994

Habitat Acres: **Occupied:** 143.3 sq ft (Popp 1988), 278 sq ft 1994 census

Potential: 30 ft wide X 2.57 mi = 9.35 ac

Riparian: 130 ft X 2.57 mi = 40.50 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This long reach of stream consists of variable habitat conditions. Arizona willow occurs in relatively low numbers, but is quite healthy. This may indicate good potential for re-establishment efforts. This area consists of a confined valley and the annual floodplain has been observed flooded after/during snowmelt nearly every year. Further downstream the canyon wall confines flows to limit total width of the riparian area, and maintains flow velocity quite well. This likely results in good habitat conditions, maintained over time. Some of the area needs improvement regarding grazing management, and involves two allotments.

Grazing Allotment Voigt/Pool Corral **Elk Herd Unit** Greer

Livestock Management Unit Home, Fobes/Lower Pastures

Site specific concerns: This area has in the past been grazed quite heavily. Livestock have always concentrated in the narrow riparian bottom below Colter Reservoir, and elk use has also been evident in this area. Recreation use is evident with some trailing by fishermen. Competition from surrounding vegetation is also heavy, but annual flooding does create some amount of fresh sediment in limited places. A small two-track road crossing below the dam needs hardening work or closing the road entirely. The small population size is also of concern.

Recent past conservation actions: The Home and Fobes Units were rested from livestock use in 1993. Livestock use in 1994 was limited to 27% of permitted numbers in these two units. Six plants have been caged to protect them from ungulate use. Significant improvement in the vigor of these plants has occurred. The Home pasture was grazed in conjunction with the Bull pasture and managed a single unit, 80 head of cows and yearlings 7/21-8/9 and 10/1-10/12 (see population #6 also). The Fobes pasture was grazed by 80 head of cows and yearlings 7/21-8/9 (19 days) and 9/5-9/30 (25 days) for a total of 117 AUMS. The plant population on the Pool

Corral Allotment is located on a bench just before the EFLCR enters a canyon reach. This plant unit was previously fenced into a small pasture. The fence was removed in 1994 and this unit was included into the Pool Knoll pasture to avoid concentrations of livestock. This unit was not grazed as a scheduled pasture in 1994 as the fence was removed after the cattle were rotated in the grazing schedule, however the unit was used as an overnight holding pasture in early June.

Proposed conservation actions

Short term: Place cages around all known plants that have not already been caged prior to livestock use in these three pastures in 1995.

Estimated Cost: \$500 FY95 Cage installations

Long term: Complete a new AMP for the Voigt Allotment by 10/96 which will establish livestock management guidelines for approximately 10 years.

Estimated Costs: \$500 FY95 and 96 LCEU planning efforts
\$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. The first monitoring and inventory information is from Galeano-Popp's survey completed in 1988.

Site: Population No. 13, Thompson Ranch.

Location: West Fork of the Black River at Thompson Ranch. Most of this habitat is located on private land.

Land Ownership: most of this area is private land, but a small portion of occupied habitat is located on the Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 3 (Popp"88) **Number of plant units mapped** 4 (1994)

Last visited: throughout the summer and fall of 1994.

Habitat Acres: **Occupied:** 84.7 sq ft (Popp 1988), 76 sq ft 1994 census

Potential: 30 ft wide X 2.38 mi = 8.65 ac

Riparian: 500 ft X 2.38 mi = 144.24 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This site is overall in good condition, but has had considerable use in the past. It has been managed as part of the Reservation Pasture, and the private land has not been fenced off in the past. Currently, boundary fences are down. The plants in this area are in fair condition, and would strongly benefit from protection. Competition from competing vegetation is evident, with sedges growing up over existing plants. Little bare soil is left for seedling establishment. Wildlife use this area extensively, and include beaver activity and elk grazing. This area has good potential for re-establishment from the hydrologic and soil condition standpoint. The West Fork of the Black River has considerable flow, and a sizable watershed behind it to keep flooding and scouring in this area relatively natural. The FR 116 road crossing could use improvement to include culverts on the floodplain designed to handle part of the flood flows.

Grazing Allotment Burro Creek/Private Land **Elk Herd Unit** Black River
Livestock Management Unit Reservation Pasture

Site specific concerns: Beaver activity, unstable stream banks, elk and livestock herbivory, dense competing vegetation, high water tables. The road crossing of FR 116 could use improvement to better handle flood flows on the floodplain. Currently, one pipe handles all flows, backing up a sizable pool when at capacity. Unstable stream banks and sedimentation from road crossings contribute some sediment. Off-road vehicles, heavy recreational fishing and camping also impact the area heavily. Small population size is also considered a major concern.

Recent past conservation actions: A new AMP has been developed for the Burro Creek Allotment (approved 9/30/93). Fifty log/boulder bank stabilization structures have been installed

for Apache trout habitat. Planting of various willow species has also been undertaken. The impact of these actions to Arizona willow is unknown. Two miles of road adjacent to the stream has been closed to reduce sedimentation and impacts to the riparian area from recreational use. Two miles of livestock management fence was constructed to prevent unplanned livestock use as a result of drift from an adjacent unit. The AMP calls for the construction of a livestock management fence which will split the Reservation Unit, creating the Thompson Unit which will serve to isolate this population into a separate riparian management unit. This will allow for reducing the duration of grazing in this area to approximately 15 days. A cattleguard needed to complete this fence was installed in 1994. The Forest continues to work with the private landowners on exchange opportunities to bring the Thompson Ranch private lands into the National Forest system.

Proposed conservation actions

Short term: Enclose the four known plants with fences to protect them from cattle and elk prior to use of this unit by livestock in 1995. Install additional stream bank stabilization structures during 1995. Complete construction of the livestock management fence (1.3 miles) to create the Thompson riparian management unit by October 1995.

Estimated Cost: \$7000 FY95 Cages and New Fencing

Long term: Continue to implement the Burro Creek AMP and monitor riparian/stream conditions.

Estimated Costs: \$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. The first available monitoring and inventory information is available from Galeano-Popp's survey completed in 1988.

Site: Population No. 14, below Thompson Ranch.

Location: West Fork of the Black River downstream from Thompson Ranch

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 8 (Popp"88) **Number of plant units mapped** 8 (1994)

Last visited: throughout the summer and fall of 1994

Habitat Acres: **Occupied:** 88.7 sq ft (Popp 1988), 146 sq ft 1994 census

Potential: 30 ft wide X 2.26 mi = 8.22 ac

Riparian: 100 ft X 2.26 mi = 27.39 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This population is strung out into approximately three locations over the whole reach. The plants are found in areas having formed benches or floodplains within the canyon. The total number of plant units found in this area is low, but plants are in good condition. This canyon receives fairly little ungulate use, and beaver activity is of little consequence. The area is suited for reintroduction of the willow due to low impacts from threats and near optimal habitat conditions resulting from unaltered flows of the West Fork of the Black River.

Grazing Allotment Burro Creek **Elk Herd Unit** Black River
Livestock Management Unit Reservation Pasture

Site specific concerns: Unstable stream banks, low beaver activity (foraging and flooding), limited elk and livestock herbivory within the entire canyon, competing vegetation, recreationists trailing along stream for fishing access, roads and off-road vehicles are all of concern.

Recent past conservation actions: A new AMP has been developed for the Burro Creek Allotment (approved 9/30/93). Twenty five log/boulder bank stabilization structures have been installed for Apache trout. The potential impact of these actions to Arizona willow is unknown. Three miles of road adjacent to the stream has been closed to the public to reduce sedimentation and impacts to the riparian area from recreational use. Fill material where an old railroad bed crossed the stream has been removed to restore the floodplain to a more natural condition.

Proposed conservation actions

Short term: Enclose the all known plants with fences to protect them from cattle and elk prior to use of this unit by livestock in 1995. The AMP calls for the construction of a livestock management fence which will further split the Reservation Unit, creating the West

Fork Unit which will serve to isolate this population into a separate riparian management unit. This will allow for reducing the duration of grazing in this area to approximately 20 days. This new fence (2.7 miles) will be completed by October 1995.

Estimated Cost: \$13,650 FY 95 Cages and New Fencing

Long term: Continue to implement the Burro Creek AMP and monitor riparian/stream conditions. Install additional bank stabilization structures along the West Fork of the Black River within the next three years. Add two extra culverts at the FR 116 road crossing of the West Fork of the Black River, to allow better passage of high flows on the floodplain instead of concentrating flows within the existing channel. These new culverts would normally be dry.

Estimated Costs: \$200/yr monitoring

Monitoring: All plants will be monitored annually according to the established protocol. The first available monitoring and inventory information is available from Galeano-Popp's survey completed in 1988.

Site: Population No. 15, Stinky Creek.

Location: Stinky Creek, a tributary to the West Fork of the Black River.

Land Ownership: Apache Sitgreaves National Forests, Springerville Ranger District.

Number of known plant units 3 (Popp"88) **Number of plant units mapped** 3 (1994)

Last visited: throughout the summer and fall of 1994.

Habitat Acres: **Occupied:** 27.5 sq ft (Popp 1988), 14.3 sq ft 1994 census.

Potential: 30 ft wide X 1.81 mi length = 6.58 ac

Riparian: 120 ft X 1.81 mi length = 26.33 ac

Mapping: located on color 1975 aerial photos, on 1:24k topo maps, and on an individual site map which includes meets and bounds directions to the plants. GIS point file to be pinpointed w/DGPS.

Narrative description of population and existing conditions: This population is located all in one area of generally good condition habitat. Stinky Creek goes dry in the upper half of the stream during the summer, but the lower half maintains some flow. The plants are located approximately halfway down the creek where flows are maintained. Ungulate grazing has been fairly light in this canyon in the recent past, and the plants do not get significant use. The size of this watershed is not extensive, and judging from stream condition, this drainage has not experienced significantly variable flows within the near past. The good habitat conditions in this drainage may allow for successful regeneration efforts.

Grazing Allotment Burro Creek **Elk Herd Unit** Black River
Livestock Management Unit Reservation Pasture

Site specific concerns: Dense competing vegetation, lack of water in drainage during low flow periods, limited herbivory from livestock and elk, sedimentation from adjacent road drainage, sections of stream with low gradient which are turning into wet meadow vegetation (Geyers willows are on the demise and also forming dwarf growth forms due to high water tables). The extremely small population size is also considered a concern to long-term viability.

Recent past conservation actions: A new AMP has been completed for the Burro Creek Allotment (approved 9/30/93). Approximately 0.7 miles of road alongside Stinky Creek was obliterated to reduce erosion and sedimentation. This section of road was a significant sediment source. Another three miles of road has been closed to the public to reduce sedimentation and impacts to the riparian area from recreational use. The AMP called for constructing two exclosures on meadow reaches of Stinky Creek. The fence (2.1 miles) for the lower exclosure was completed in 1994. This fence serves to exclude cattle from 1.0 miles of potential Arizona willow habitat.

Paired exclosures were planned for an upper reach of Stinky Creek. An elk/cattle study fence is planned for half of this meadow. This fence will enclose the three known plant units. A cattle exclosure fence was planned for the other half of this meadow reach for comparison purposes. The cattle exclosure portion of this upper meadow fencing project was completed in 1994. Work on the elk/cattle portion was initiated. These paired exclosures would be a possible site for proposed studies relative to ungulate use and regeneration of Arizona willow.

Proposed conservation actions

Short term: Complete the elk/cattle exclosure fence to protect the known plants from browsing prior to use of this unit by livestock in 1995.

The AMP also called for isolating Stinky Creek into a separate riparian management unit to reduce the duration of grazing to approximately 20 days. This will be accomplished with the same fence (2.7 miles) discussed for Population No. 14 above which is scheduled for completion by October 1995.

Estimated Cost: \$5000 FY95 elk/livestock exclosure installation

Long term: Continue to implement the Burro Creek AMP and monitor riparian/stream conditions. Harden road crossings to reduce erosion and sedimentation. Complete within three years.

Estimated Costs: \$500/yr monitoring and maintenance of exclosure

Monitoring: All plants will be monitored annually according to the established protocol. The first available monitoring and inventory information for this area is available from Galeano-Popp's survey completed in 1988.

Total Cost of Short Term Actions: \$32,750